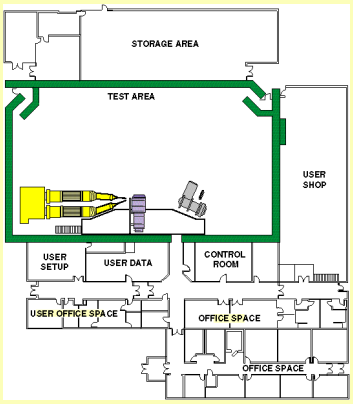
DECADE

DoD Center for Radiation Effects Testing

The Decade Radiation Test Facility (DRTF) is located at Arnold Engineering Development Center (AEDC), Arnold Air Force Base, Tennessee. Decade is a new advanced generation nuclear test facility designed to test 21st century space and missile systems and their components against nuclear weapons effects. The first Decade quad is configured in the hot X-ray mode with a scheduled Initial Operating Capability (IOC) in early 2000 and planned additions will provide both medium area hot and cold X-rays by late 2000. Investment resources for the new facility were provided by the Defense Threat Reduction Agency (DTRA) and proposed technology enhancements are in progress.

Decade will employ inductive energy storage technology to provide the high power levels (10 terawatts per quad) required to produce threat level outputs greater than 16 krads of radiation over 2250 cm^2. Ongoing DTRA Research and Development (R&D) programs will result in Planned Product Performance Improvements to include increased quad output, decreased endpoint voltage, high dose, and high dose rate options. Significant improvements in Plasma Radiation Source (PRS) output is also projected, along with associated debris mitigation capability.



The Facility is designed with a number of user-oriented features: 1,000 square feet of floor space for user data acquisition needs, dedicated test setup area, user shop, and classified testing capability, along with data analysis and storage capabilities.

A Central Test and Evaluation Investment Program (CTEIP) proposal has been submitted to complete this facility with advanced system test capabilities which currently do not exist. At Full Operating Capability (FOC), the Decade Radiation Test Facility — Enhanced (DRTF-E) could provide full operational capability to include 1) large area hot and cold X-rays utilizing two Decade quads; 2) prompt gamma radiation; 3) debris gamma and beta radiation capability; and 4) an advanced test bed consisting of a cryogenic vacuum chamber with Infrared (IR) scene generation and nuclear clutter simulation. Presently, prompt radiation testing is confined to single radiation source testing (X-rays, gamma, etc.). Unlike single environment facilities, DRTF-E will focus on subsystem/system level testing with multiple environment capabilities that more accurately simulate the complex radiation time history of an exo-atmospheric event. This modern test facility is the only DoD facility with capability to demonstrate that systems can meet their high confidence requirements and will survive and function in prompt radiation environments which might be experienced by the system during its combat mission.

Decade Radiation Test Facility

Radiation Source Specifications:

Source	Average	U**	Area	Pulse Width	Average Peak Diode Voltage
Bremsstrahlung	Dose*	2.0		FWHM	
Decade Quad	15-20 krads(Si)		2,250 cm^2	< 50 nsec	< 1.8 MV
MBS	400 rads (Si)		3,000 cm^2	30 nsec	< 200 kV

* Area-weighted average

** Uniformity (U) is defined as the ratio of Maximum Radiation to Minimum Radiation over the total area measured in a rectangle with an Aspect Ratio less than or equal to 1.2:1.0

Fully Rated Operations: The facility has the capability to support three shots a day. It can be configured to accommodate various security levels including Sensitive Compartmented Information (SCI).

User Data Acquisition System

The data storage and management system capability is sufficient to record, analyze, and archive collected data. For personal computer hookup, the UDAS network design supports both IBM and Macintosh computers with an Ethernet connection. The UDAS will use DEC Pathworks networking software, which supports Windows 95, Window-NT, DECnet, TCP/IP, and Appletalk.

UDAS User Computer Hardware:

Two Digital AlphaServer 2100 4/275 Dual Processor
128 MBytes memory
10 GBytes disk storage
20 GByte linear tape, CD-ROM
4-mm DAT tape, 9-track tape
Four weeks on-line archival of test data

UDAS Software:

VMS, Windows-NT, OSF/1 operating systems
FORTRAN, C and C++ compilers
DECnet, TCP/IP, NFS Network Software
IDL Data Processing and Analysis

Security:

C2 rated operating system
Classified and unclassified removable disks

Instrumentation:

Initial instrument setup in less than four hours
Processed data available in 20 minutes after shot
Quick look within five minutes to permit planning for next shot parameters
Noise floor ~10 mV peak during pulse, 10 µV after 100 µs
148 channels available (expansion to 350 is planned)

Equipment Parameters:

Analog Bandwidth	Sampling Rate samples/sec	Number of Channels
DC - 1 GHz	4G	5
DC - 400 MHz	2G	47
DC - 100 MHz	500 M	32
DC - 10 MHz	50 M	32
DC - 100 KHz	500 K	32

Test Support: AEDC is a full service test complex with vast experience in space, aeromechanical and propulsion testing. An established test infrastructure permits excellent customer interactions ranging from pre-test analysis to test planning to evaluation of test data. Fiber optic links are connected to AEDC 02K, Exemplar and Cray mainframes for additional computational resources. Various codes are available to perform analysis of circuits, pulse power, radiation sources, and effects on electronics.

ARNOLD ENGINEERING DEVELOPMENT CENTER

AEDC is the world's most diverse complex of aerospace flight simulation test facilities. Since it opened in 1951, the center has been involved in the development of nearly all U.S. military and NASA high-performance aircraft, missiles and space systems. The center's gas turbine and rocket engine propulsion test cells, aerodynamic and propulsion wind tunnels, space chambers and ballistic ranges can simulate virtually every aspect of flight from ground level to deep space. Ground testing before flight reduces risks, saves lives, equipment, and money in operational testing and use. For more information about AEDC visit the center's Internet Web site at www.arnold.af.mil.

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